

## **All Exam Are Taken by Arts Facult,DU**

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### **Rupali Bank Cash(Cancelled)-2018**

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Question-1:A man's salary in 2014 was tk 20,000 per month and it increased by 10% each year. Find how much he earned in the years 2015 to 2017 inclusive.

Solution:

Given that,

In 2014 his initial salary per month was

$$= 20000 \text{ tk}$$

So,His annual salary in 2014 was

$$= 20000 \times 12 = 240,000 \text{ tk}$$

And Also given that,Each year his annual salary increased by 10%

So, In 2015 his salary was

$$= 240,000 \times 110/100$$

$$= 264,000 \text{ tk}$$

In 2016 his salary was ,

$$= 264,000 \times 110/100$$

$$= 290,400 \text{ tk}$$

In 2017 his salary was

$$= 290,400 \times 110/100$$

$$= 319,440$$

So total earned by him from 2015 to 2017 inclusive

$$= 264,000 + 290,400 + 319,440$$

$$= 8,73,840 \text{ tk}$$

Answer: 8,73,840 tk

Question-2:The profit of a company is given in Taka by  $P = 3x^2 - 35x + 50$ , where x is the amount in Taka spent on advertising. For what values of x does the company make a profit?

Solution:

Here,

$$P = 3x^2 - 35x + 50$$

Now,if the company makes profit,then  $P > 0$

So,

$$3x^2 - 35x + 50 > 0$$

$$\Rightarrow 3x^2 - 30x - 5x + 50 > 0$$

$$\Rightarrow 3x(x-10) - 5(x-10) > 0$$

$$\Rightarrow (x-10)(3x-5) > 0 \text{-----}(1)$$

As this equation(1) is greater than 0, So the value of the two roots must have different values in different intervals.

Now, the equation(1), we have

$$x > 10$$

Or, the value of x less than 5/3 and greater than or equal to 0

i.e.  $0 \leq x < 5/3$ , Because advertising cost can not be negative

So, the company makes a profit, the values of  $x = \{0 \leq x < 5/3 \text{ or } x > 10\}$

Answer:  $x = \{0 \leq x < 5/3 \text{ or } x > 10\}$

Note: Why  $x = \{0 \leq x < 5/3 \text{ or } x > 10\}$

$$(x-10)(3x-5) > 0 \text{-----}(1)$$

If  $x > 10$  then,

The value of x 11, 12, 13 etc

From equation (1) when  $x = 11$

$$(11-10) * (3 * 11 - 5) > 0$$

Or,  $28 > 0$

$28 > 0$  which fulfill the question condition

So,  $x > 10$

Again,

If  $x < 5/2$  then  $x = 2, 2.5, 2.6, 7, 8, 9, 10$

From equation (1) when  $x = 2$

$$(2-10) * (3 * 2 - 5) > 0$$

Or,  $-8 * 1 > 0$  Which is not acceptable under this condition. Because question said the company makes profit

So,  $x < 5/2$

Again,  $x = 9$  then

$$(9-10) * (9 * 2 - 5) > 0$$

Negative value  $> 0$  which is not acceptable under this question condition

So, the company makes a profit, the values of  $x = \{0 \leq x < 5/3 \text{ or } x > 10\}$

Question-3: Find the three digit prime number whose sum of the digits is 11 and each digit representing a prime number. Justify your answer.

Solution:

Since the sum of the 3 digits is 11 and each digit represents a prime number,

So, the number less than 11 .

And the 3 digits may be 2,2,7 or 3,3,5

Because  $2+2+7=11$  and  $3+3+5=11$

Now using the digit 2,2,7 we have prime number 227 .Because other two numbers i.e. 722 and 272 are divisible by 2 and thus are not prime

Similarly 353 is prime number other two numbers 533 & 335 is not prime number

In case of 227, sum of the digits is  $2+2+7 = 11$ .

And 2, 2, 7 all the digits are prime.

Similarly, In case of 353, sum of the digits is  $3+5+3 = 11$ .

And 3, 5, 3 all the digits are prime.

Answer: 227 & 353

Question-4: Solve:  $x/2 + 6/y = 9$ ;  $x/3 + 2/y = 5$

Solution:

$$x/2 + 6/y = 9 \text{-----(1)}$$

$$x/3 + 2/y = 5 \text{-----(2)}$$

$$(ii) \times 3 - (i) = \Rightarrow$$

$$\Rightarrow x - x/2 = 6$$

$$\Rightarrow x/2 = 6$$

$$\Rightarrow x = 12$$

$$\text{From (i)} \Rightarrow 12/2 + 6/y = 9$$

$$\Rightarrow 6/y = 3$$

$$y = 2$$

$$\text{Ans. } (x, y) = (12, 2)$$

Question-5: The Length of each side of an isosceles triangle is 10 cm and the included angle between those two sides is  $45^\circ$ . Find the area of the triangle.

We know that,

$\sin 45^\circ = \text{perpendicular/hypotenuse}$

$$1/\sqrt{2} = x/10 \text{ Or, } x = 10/\sqrt{2}$$

Then

$$\begin{aligned}
 \text{Area of triangle} &= \frac{1}{2} * b * h \\
 &= \frac{1}{2} * 10 * 10 / \sqrt{2} \\
 &= 50 / \sqrt{2} \\
 &= 50 * \sqrt{2} / \sqrt{2} * \sqrt{2} (\text{both side multiply root 2}) \\
 &= 50 * \sqrt{2} / 2 \\
 &= 25\sqrt{2}
 \end{aligned}$$

Ans:  $25\sqrt{2}$

6. A committee of 5 is to be formed from 6 male students and 5 female students. In how many ways can this be done so that the committee contains at least one male and one female students?

Solution:

Given that,

At least one male and one female are included in the committee

So, There are 4 ways to select the committee of following condition,

Way	Male(6)	Female(5)
01.	${}^6C_1$	${}^5C_4$
02.	${}^6C_2$	${}^5C_3$
03.	${}^6C_3$	${}^5C_2$
04.	${}^6C_4$	${}^5C_1$

Way-1:  ${}^6C_1 * {}^5C_4 = 5 * 6 = 30$

Way-2:  ${}^6C_2 * {}^5C_3 = 15 * 10 = 150$

Way-3:  ${}^6C_3 * {}^5C_2 = 20 * 10 = 200$

Way-4:  ${}^6C_4 * {}^5C_1 = 15 * 5 = 75$

Total ways = 455

Answer: 455

Question-7: 70 students are studying physics, mathematics and chemistry. 40 students study mathematics, 35 study physics and 30 students study chemistry. 15 students are studying all the subjects. How many students are studying exactly two of the subjects?

Solution:

Students that studying physics,

Set P = 35

Students that studying chemistry, Set C = 30

Students that studying maths

Set M = 40

Students are studying all the subjects,  $P \cap C \cap M = 15$

Let,

$$PnC + CnM + PnM = x$$

$$\text{Total} = P + C + M - (PnC + CnM + PnM) + (PnCnM) + \text{Neither}$$

$$\text{Or}, 70 = 35 + 30 + 40 - x + 15 + 0$$

$$\text{Or}, x = 120 - 70$$

$$\text{Or}, x = 50$$

$$\text{Hence}, PnC + CnM + PnM = 50$$

$$\text{So}, \text{Exactly studying two of the subjects} = 50 - (15 \times 3) = 5$$

Answer: 5

**#Alternative:**

$$\text{Total} = \text{All single} - (\text{exactly two groups overlap}) - \{2 \times \text{all three}\} + \text{None}$$

$$\text{Or}, 70 = 40 + 35 + 30 - (\text{Exactly two groups overlap}) - 2 \times 15 + 0$$

$$\text{Or}, 70 = 75 - (\text{Exactly two groups overlap})$$

$$\text{Or}, \text{Exactly two groups} = 5$$

Answer: 5

### ➤ **BDBL SENIOR OFFICER 2018**

**Question-1:** The profit of a company is given in Taka by  $P = 3x^2 - 35x + 50$ , where  $x$  is the amount in Taka spent on advertising. For what values of  $x$  does the company make a profit? [BDBL SENIOR OFFICER 2018]

**Solution:**

Here,

$$P = 3x^2 - 35x + 50$$

Now, if the company makes profit, then  $P > 0$

So,

$$3x^2 - 35x + 50 > 0$$

$$\Rightarrow 3x^2 - 30x - 5x + 50 > 0$$

$$\Rightarrow 3x(x-10) - 5(x-10) > 0$$

$$\Rightarrow (x-10)(3x-5) > 0 \text{-----(1)}$$

As this equation (1) is greater than 0, So the value of the two roots must have different values in different intervals.

Now, the equation (1), we have

$$x > 10$$

Or, the value of  $x$  less than  $5/3$  and greater than or equal to 0

i.e.  $0 \leq x < 5/3$ , Because advertising cost can not be negative

So, the company makes a profit, the values of  $x = \{0 \leq x < 5/3 \text{ or } x > 10\}$

**Answer:**  $x = \{0 \leq x < 5/3 \text{ or } x > 10\}$

**Question-2:** An amount of Tk. 7200 is spent to cover the floor of a room by carpet.

**An amount of Tk. 576 would be saved if the breadth were 3 meters less. What is the breadth of the room? [BDBL SENIOR OFFICER 2018]**

সমাধান:

মনে করি, দৈর্ঘ্য  $x$  মি. , প্রস্থ  $y$  মি

প্রতি বর্গ মি খরচ হবে  $z$  টাকা

প্রশ্নমতে,

$$xyz = 9200 \text{-----} (১)$$

$$xz(y-3) = 9200 - 576$$

$$= 8624 \text{-----} (২)$$

সমীকরণ(১) কে (২) নং দিয়ে ভাগ করে= $\Rightarrow$

$$xyz/xz(y-3) = 9200/8624$$

$$\text{বা, } y = 79.5$$

$$\text{উ: } 79.5 \text{ মি}$$

অথবা:

৫৭৬ টাকা কম খরচ হয় ৩ মিটার এ

১ টাকা কম খরচ হয়  $3 \div 576$

৯২০০ টাকা কম খরচ হয়  $(3 \times 9200) \div 576$  মিটার

$$= 79.5 \text{ মিটার}$$

$$\text{উ: } 79.5 \text{ মি}$$

**Question-3: Find the three digit prime number whose sum of the digits is 11 and each digit representing a prime number. Justify your answer. [BDBL SENIOR OFFICER 2018]**

**Solution:**

Since the sum of the 3 digits is 11 and each digit represents a prime number,

So, the number less than 11 .

And the 3 digits may be 2,2,7 or 3,3,5

Because  $2+2+7=11$  and  $3+3+5=11$

Now using the digit 2,2,7 we have prime number 227 .Because other two numbers i.e. 722 and 272 are divisible by 2 and thus are not prime

Similarly 353 is prime number other two numbers 533 & 335 is not prime number

In case of 227, sum of the digits is  $2+2+7 = 11$ .

And 2, 2, 7 all the digits are prime.

Similarly, In case of 353, sum of the digits is  $3+5+3 = 11$ .

And 3, 5, 3 all the digits are prime.

**Answer:** 227 & 353

**Question-4: If  $a/(q-r) = b/(r-p) = c/(p-q)$  then show that,  $a+b+c = pa+qb+rc$  [BDBL SENIOR OFFICER 2018]**

**Solution:**

Let,

$$a/(q-r) = b/(r-p) = c/(p-q) = k$$

$$\text{So, } a = k(q-r);$$

$$b = k(r-p);$$

and  $c = k(p-q)$

Now,

L.H.S.  $\Rightarrow$

$$a+b+c = k(q-r) + k(r-p) + k(p-q)$$

$$= k(q-r+r-p+p-q)$$

$$= k \times 0 = 0$$

And,

R.H.S.  $\Rightarrow$

$$pa+qb+rc = p \cdot k(q-r) + q \cdot k(r-p) + r \cdot k(p-q)$$

$$= kpq - kpr + kqr - kpq + kpr - kqr$$

$$= 0$$

So, L.H.S. = R.H.S. (**Shown**)

**Question-5: Prove that a cyclic parallelogram must be a rectangle.**

[BDBL SENIOR OFFICER 2018]

**Solution:**

Let,

ABCD be the cyclic parallelogram

Prove that, ABCD is a rectangle

Since ABCD is a parallelogram

$$\angle A = \angle C \text{ ----- (1)}$$

$$\text{And, } \angle A + \angle C = 180^\circ$$

$$\text{since } \angle A = \angle C$$

$$\text{So, } \angle A + \angle A = 180^\circ$$

$$\text{Or, } 2\angle A = 180^\circ$$

$$\text{Or, } \angle A = 90^\circ$$

if any one angle of parallelogram is  $90^\circ$ , the parallelogram is a rectangle.

**Question-6: After traveling 108 km, a cyclist observed that he would have required 3 hrs less if he could have traveled at a speed 3 km/hr more. At what speed did he travel? [BDBL SENIOR OFFICER 2018]**

**Solution:**

Let,

The speed be  $x$  km/hr

According to the question,

$$(108/x) - \{108/(x+3)\} = 3$$

$$\text{Or, } (x-9)(x+12) = 0$$

So,

$$x = 9$$

$$x = -12 \text{ [It is not acceptable] } \text{Answer: } 9 \text{ km/hr}$$

**Question-7: Solve:  $x/2 + 6/y = 9$ ;  $x/3 + 2/y = 4$  [BDBL SENIOR OFFICER 2018]**

**Solution:**

$$x/2 + 6/y = 9 \text{ ----- (1)}$$

$$x/3 + 2/y = 4 \text{ ----- (2)}$$

$$(ii) \times 3 - (i) = \Rightarrow$$

$$\Rightarrow x - x/2 = 3$$

$$\Rightarrow x/2 = 3$$

$$\Rightarrow x = 6$$

$$\text{From (i)} \Rightarrow 6/2 + 6/y = 9$$

$$\Rightarrow 6/y = 6$$

$$y = 1$$

$$\text{Ans. } (x, y) =$$

## BKB CASH OFFICER-2018

**Question-1:** The sum of three numbers in an Arithmetic Progression is 30. The sum of their squares is 318. Find the numbers. [BKB CASH OFFICER 2018]

**Solution:**

Let,

The 2nd term is a

and common difference is d

So,

1st term be  $= a-d$

2nd term be  $= a$

3rd term be  $= a+d$

According to the question,

$$a-d+a+a+d=30$$

$$\Rightarrow 3a=30$$

$$\Rightarrow a=10$$

So, we can write,

2nd term is 10

1st term  $= 10-d$

and

3rd term  $= 10+d$

Again,

$$(10-d)^2 + 10^2 + (10+d)^2 = 318$$

$$\Rightarrow 100 - 20d + d^2 + 100 + 100 + 20d + d^2 = 318$$

$$\Rightarrow d=3$$

So,

1st term  $= 10-3=7$  2nd term  $= 10$  and 3rd term  $= 10+3=13$

**answer:** 7, 10, 13

**Question-2:** Among 50 people, 35 can speak English, 25 can both English and Bangla, and each can speak at least one of the two languages. How many speak only Bangla?

[BKB CASH OFFICER 2018]

**Solution:**

Given that,

Total people  $= 50$

Speak English  $= 35$

Speak both Bangla & English  $= 25$

Only English speak  $= (35-25)=10$

Bangla speak  $= (50-10)=40$



Only Bangla speak  $(40-25)=15$

**Answer:15**

**Alternative:**

Total=All single -Both+none

Or,  $50=35+B-25+0$

or,  $B=40$

So total 40 speak bangla.

speak only bangla  $=40-25=15$

**Answer:15**

**Question-3:  $64x^3 - 9ax^2 + 108x - b$ . what is the value of a and b for making it perfect cube. [BKB CASH OFFICER 2018]**

**Solution:**

Given that,

$$64x^3 - 9ax^2 + 108x - q^3$$

We know the formula for perfect cube

$$(p-q)^3 = p^3 - 3.p^2.q + 3.p.q^2 - q^3$$

Comparing with given Equation,

$$p^3 = 64x^3$$

$$P = (4x)^3 \dots\dots\dots(1)$$

Again,

$$3p^2q = 9ax^2 \dots\dots\dots(2)$$

$$3pq^2 = 108x \dots\dots\dots(3)$$

$$q^3 = b \dots\dots(4)$$

**From (3) we get,**

$$3pq^2 = 108x = 3.4x.3^2$$

**So,  $q = 3$**

**From (4)  $\Rightarrow$**

$$b = 3^3$$

$$b = 27$$

**From (2)  $\Rightarrow$**

$$3p^2q = 9ax^2$$

$$\text{Or, } 9ax^2 \cdot 3.(4x)^2 \cdot 3 = 9ax^2$$

$$\text{Or, } 144x^2 = 9ax^2$$

**Or,  $a = 16$**  So  $a = 16$  and  $b = 27$  **Answer: 16 and 27**

**Question-4: The Length of each side of an isosceles triangle is 10 cm and the included angle between those two sides is  $45^\circ$ . Find the area of the triangle. [BKB CASH OFFICER 2018]**

**Solution:**

We know that,

$\sin 45^\circ = \text{perpendicular/hypotenuse}$

$$\frac{1}{\sqrt{2}} = x/10$$

$$x = 10/\sqrt{2}$$

Then

$$\text{Area of triangle} = \frac{1}{2} * b * h$$

$$= \frac{1}{2} * 10 * 10/\sqrt{2}$$

$$= 50/\sqrt{2}$$

$$= 50 * \sqrt{2}/\sqrt{2} * \sqrt{2} \text{ (both side multiply root 2)}$$

$$= 50 * \sqrt{2}/2$$

$$= 25\sqrt{2}$$

$$\text{Ans: } 25\sqrt{2}$$

**Question-5: Price of 3 tables and 5 chairs is 2000 tk. Price of 5 table and 7 chairs is 3200 tk. What is the price of 1 table and 1 chair? [BKB CASH OFFICER 2018]**

**Solution:**

Let,

Cost price of 1 table be x

And

Cost price of 1 chair be y

$$3x + 5y = 2000 \dots\dots\dots(i)$$

$$5x + 7y = 3200 \dots\dots\dots(ii)$$

$$(i) * 5 - (ii) * 3 = \Rightarrow$$

$$15x + 25y = 10000$$

$$15x + 21y = 9600$$

$$\dots\dots\dots$$

$$\text{Or, } 4y = 400$$

$$\text{or, } y = 100 \text{ tk}$$

So,

$$3x + 5 * 100 = 2000$$

$$\text{Or } 3x = 2000 - 500$$

$$\text{or } 3x = 1500$$

$$\text{or } x = 500$$

**Answer:** The cost of 1 table is tk 500 and 1 chair is 100 tk and total 600 tk

**Question-6: A committee consist of 3 members. If there are 7 men and 5 women available to serve on the committee. How many different committee can be formed? [BKB CASH OFFICER 2018]**

**Solution:**

Total committee member should be selected = 3

men = 7 and women = 5

so the combinations can be:

$$(I) {}^7C_3 * {}^5C_0 = 35$$

$$(II) {}^7C_2 * {}^5C_1 = 21 * 5 = 105$$

$$(III) {}^7C_1 * {}^5C_2 = 7 * 10 = 70$$

$$(IV) {}^7C_0 * {}^5C_3 = 1 * 10 = 10$$

so total no of committe will be=35+105+70+10=220

**Answer:**220

**Question-7:**A and B started a business with the capital 3000 and 4000 tk. After 8 months, A invested tk 2500 more in the business and 7 months after, total profit 980 tk. Find the share of each.[ BKB CASH OFFICER 2018]

**Solution:**

Total business duration ( 8+7)=15 months.

So, A's time equivalent investment of 1 month

$$=\{3000*8+(3000+2500)*7=24000+38500\}$$

$$=62500 \text{ tk}$$

And

$$\text{B's investment}=4000*15=60000 \text{ tk}$$

Now,their investment ratio A: B

$$=62500:60000$$

$$=25:24$$

Since,

$$\text{A get profit}=980*25/49=500 \text{ tk}$$

$$\text{and B get profit}=980*24/49=480 \text{ tk}$$

**Answer:** 500 and 480 tk

**Question-8:**Resolve into factors:  $a^2+1/a^2+2-2a-2/a$ [BKB CASH OFFICER 2018]

**Solution:**

$$a^2+1/a^2+2-2a-2/a$$

$$=(a+1/a)^2-2a.1/a+2-2(a+1/a)$$

$$=(a+1/a)^2-2+2-2(a+1/a)$$

$$=(a+1/a)^2-2(a+1/a)$$

$$=(a+1/a)(a+1/a-2)$$

**Answer:**  $(a+1/a)(a+1/a-2)$

## ➤ ABL SO(Auditor)-2018

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**Question-1:**In a survey at an airport,55 said that last year they had been to Spain,53 to France and 79 to Germany,18 had been to Spain and France ,17 to Spain and Germany,while 10 had to all three countries.How many travelers took part in the Survey?[Agrani Bank SO (Auditor) Written-2018]

**Solution:**

Let ,

The Number of people who travelled to Spain= $n(A)$

The Number of people who travelled to France= $n(B)$

And

The Number of people who travelled to Germany= $n(C)$

Given that,

$$n(A)=55$$

$$n(B)=53$$

$$n(C)=79$$

$$n(A \cap B) = 18$$

$$n(A \cap C)=17$$

and

$$n(A \cap B \cap C)=10$$

We know that

$$n(U) = n(A) + n(B) + n(C) - n(A \cap B) - n(A \cap C) - n(B \cap C) + n(A \cap B \cap C)$$

$$\text{Or, } n(U) = 55 + 53 + 79 - 18 - 17 - 0 + 10$$

$$\text{Or, } n(U) = 162$$

Hence, 162 members took part in the survey

Answer: 162

Short cut:

Total = S + F + G - sum of two group overlap + all three + none

$$\text{Total} = 55 + 53 + 79 - 18 - 17 - 0 + 10$$

$$= 162$$

**Answer: 162**

**Question-2: A shopkeeper sells two shirts at the same price. He makes 10% profit on one and losses 10% on the other. How much percentage does he gain or lose? [Agrani Bank SO (Auditor) Written-2018]**

**Solution :**

Let,

Selling price of first & Second shirt be = tk 100

First case,

10% profit on CP

SO,

$$CP + CP \text{ of } 10\% = 100$$

$$\text{Or, } CP = 1000/11$$

Second case,

10% loss on CP

$$CP - CP \text{ of } 10\% = 100$$

$$\text{Or, } CP = 1000/9$$

$$\text{Total Cost price} = (1000/11) + (1000/9)$$

$$= 202.02 \text{ tk}$$

$$\text{Total Selling price} = (100 + 100) = 200 \text{ tk}$$

$$\text{Loss} = CP - SP = 202.2 - 200 = 2.02$$

Loss percentage

$$= (2.02 * 100) / 202.02$$

$$= 1\%$$

**Alternative for MCQ:**

By applying effective rate:

$$= 10 - 10 - (10 * 10 / 100)$$

$$= 1\% \text{ loss}$$

**Another Alternative:**

In the case where loss and gain percentage is common on same selling price, always a loss incurs in total deal. And this can be calculated by a short-cut:

Loss on total deal,

$$= (\text{Common loss or gain percentage} / 10)^2 = (10/10)^2 \\ = 1\%$$

Question-3: Find the HCF of

$$x^3 - 16x, 2x^3 + 9x^2 + 4x,$$

$$2x^3 + x^2 - 28x$$

**Solution:**

First case,

$$x^3 - 16x$$

$$= x(x^2 - 16)$$

$$= x(x-4)(x+4)$$

Second case,

$$2x^3 + 9x^2 + 4x$$

$$= x(2x^2 + 9x + 4)$$

$$= x(x+4)(2x+1)$$

3rd case,

$$(2x^3) - x^2 - 28x$$

$$= x(2x^2 - x - 28)$$

$$= x(x+4)(2x-7)$$

Hence, HFC of these factors

$$= x(x+4)$$

**Answer:**  $x(x+4)$

**Question-4:** The length of a tangent (স্পর্শক) from a point A at distance 5 cm from the centre of the circle is 4 cm. Find the radius of the circle. [Agrani Bank SO (Auditor) -2018]

**Solution:**

Let,

Radius of the circle be =  $r$

$$r^2 = (5^2) - (4^2)$$

$$\text{Or, } r^2 = 9$$

$$\text{Or, } r = 3$$

So, Radius of circle be 3 cm [Answer]

**Question-5 : Simplify:**  $(5x+2)/(x^2-x-20) + (2x-1)/(x^2-4x-5)$  [Agrani Bank SO (Auditor) Written-2018]

**Answer :**  $(7x^2+14x-2)/(x-5)(x+4)(x+1)$

1:Twice the width of a rectangle is 10 meters more than its length. If the area of the region enclosed by the rectangle is 600 square meters then find its perimeter.[\[BHBFC SO 2017\]](#)

Solution:

Let,

Width of rectangle is  $x$  m

And

Length of the rectangle is  $2x-10$  m

According to the question,

$$x(2x-10)=600$$

$$\text{or, } x^2-5x-300=0$$

$$\text{or, } (x-20)(x+15)=0$$

Here,  $x=20$

Either

$x=-15$  [it's not acceptable]

So, the width of rectangle is 20 m

Length= $(20 \times 2 - 10) = 30$  m

Perimeter of the rectangle is  $=2(30+20)$

$=100$  m

Ans:100 m

2:A boat running upstream takes 8 hours 48 minutes to cover a certain distance, while it takes 4 hours to cover the same distance running downstream. What is the ratio between the speed of the boat and speed of the water current respectively?

[\[BHBFC SO 2017\]](#)

Solution :

Let,

Speed of the boat is  $x$

Speed of the current is  $y$

Speed of the downstream= $(x+y)$

Speed of the upstream= $(x-y)$

According to the question,

$$\{8.8(x-y)\}=\{4(x+y)\}$$

$$\text{or, } 8.8x-8.8y=4x+4y$$

$$\text{or, } 4.8x=12.8y$$

$$\text{or, } 24x=64y$$

$$\text{or, } x:y=8:3$$

And:8:3

3:A customer bought 5 pencils and 6 erasers at tk. 80. Next week, the price of each pencil increases by 20% but the price of erasers remains unchanged. Now the customer buys 2 pencils and 3 erasers at tk. 39. Find the new price of each pencil.

[\[BHBFC SO 2017\]](#)

∴

Solution:

Let,

Price of each pencil be P

Price of each eraser be E

New price of each pencil

$$=P \times \frac{6}{5}$$

$$=6P/5$$

So, price of 2 pencil

$$=2 \times 6P/5$$

$$=2.4P$$

According to the question,

$$5P+6E=80 \text{-----(i)}$$

$$2.4P+3E=39 \text{-----(ii)}$$

$$(i)-(ii) \times 2$$

$$5P+6E=80$$

$$4.8P+6E=78$$

$$\text{-----}$$

$$0.2P=2$$

$$\text{Or, } P=2/0.2$$

$$=10$$

So, the new price of the pencil

$$10 \times \frac{6}{5} = 12$$

Ans: 12 tk

4: A, B and C can complete a work in 12, 15 and 25 days respectively. A and B started working together whereas C worked with them in every third day. Find the number of days required to complete the work. [\[BHBFC SO 2017\]](#)

Solution:

A and B together can complete in 1 day

$$= \frac{1}{12} + \frac{1}{15} = \frac{9}{60} = \frac{3}{20} \text{ of the work.}$$

A and B with the help of C can complete in 1 day

$$= (\frac{3}{20} + \frac{1}{25}) \text{ part of the work}$$

$$= \frac{19}{100} \text{ part of the work.}$$

So, their 3 days' work

$$= 2 \times \frac{3}{20} + \frac{19}{100}$$

$$= \frac{(30+19)}{100}$$

$$= \frac{49}{100} \text{ of the work.}$$

So, their  $3 \times 2 = 6$  days' work

$$= \frac{49 \times 2}{100}$$

$$= \frac{49}{50} \text{ of the work.}$$

Remaining work

$$= 1 - \frac{49}{50}$$

$$= \frac{1}{50} \text{ of the work.}$$

on the 7th day,

A and B will take  $\frac{1}{15}$  portion work

$$= \{ \frac{20}{50} \times 3 \} = 0.133 \text{ day's}$$

Therefore, the required number of days  
 $= (6 + 1.133) = 6.133$  days.  
Answer: 6.133 days.

5: The price of a shirt and a pant together is Tk. 1300. If the price of the shirt increases by 5% and that of the pant by 10%, it costs Tk. 1405 to buy those two things. Find the respective price of a shirt and a pant. [\[BHBFC SO 2017\]](#)

∴

Solution:

Suppose,

The prices of a shirt and a pant are Tk.  $x$  and Tk.  $y$  respectively. According to the question:

$$x + y = 1300 \text{ ----- (i)}$$

$$1.05x + 1.1y = 1405 \text{ ----- (ii)}$$

Subtracting from

$$(i) \times 1.1 - (ii) = \Rightarrow$$

$$0.05x = 25$$

$$\text{Or, } x = 500$$

Substituting the value of  $x$  in equation (i) we get,

$$500 + y = 1300 \Rightarrow y = 800.$$

Answer: Shirt Tk. 500, Pant Tk. 800.

Question-6: 3 coins are tossed at random. Show the sample space and find the probability of getting: - (i) one head two tails

(ii) One tail

(iii) One tail and two heads

Solution:

∴

Total Sample Space after tossed 3 coins randomly

$= \text{HHH, HHT, HTH, THH, HTT, THT, TTH, TTT}$

Probability of getting one head and two tails: In the sample space we can see, a total of 8 types of outcome is possible.

Among these 8 types of outcomes, the combinations with one head and two tails are ----

HTT, THT, TTH,

3 outcomes.

So, the required probability is

$$\frac{3}{8}$$

(ii) Probability of getting one tail:

Above the sample space we can see that, a total of 8 types of outcome is possible.

Among these 8 types of outcomes, the combinations with one tail are -- HHT, HTH, THH, 3 outcomes.

So, the required probability is  $\frac{3}{8}$

(iii) Probability of getting one tail and two heads: Above the sample space we can see

that, a total of 8 types of outcome is possible. Among these 8 types of outcomes, the

combinations with one tail and two heads are : HHT, HTH, THH, i.e: 3 outcomes. So, the required probability is  $\frac{3}{8}$ .



Answer:

Total Sample Space = {HHH, HHT, HTH, THH, HTT, THT, TTH, TTT),

(i)  $\frac{3}{8}$ , (ii)  $\frac{3}{8}$ , (iii)  $\frac{3}{8}$ .